

## Wilderness Science

*The richest values of wilderness lie not in the days of Daniel Boone, nor even in the present, but rather in the future.*

—ALDO LEOPOLD

### Aldo Leopold Wilderness Research Institute

Aldo Leopold was one of the early leaders of the American wilderness movement. He was responsible for establishing the nation's first official wilderness area, the Gila Wilderness, in the Gila National Forest in New Mexico. Captivated by the natural world and intent on learning about it, Leopold was an advocate for applying sound science to public land management. The Aldo Leopold Wilderness Research Institute (ALWRI) was established by the Forest Service in 1993 to operate under an interagency agreement between the U.S. Department of Agriculture and four agencies of the U.S. Department of the Interior (Bureau of Land Management, Geological Survey, National Park Service and Fish and Wildlife Service).

While many scientists conduct discipline-focused research relevant to wilderness, ALWRI is the only federal research group primarily focused on research needed to sustain wilderness. The Leopold Institute is dedicated to the following goals:

- To develop the knowledge needed to protect and preserve wilderness and the ecological and social values derived from wilderness and similarly managed lands, and
- To communicate and apply this knowledge to the wilderness management agencies and other user groups.

The Aldo Leopold Wilderness Research Institute is dedicated to the development and dissemination of knowledge needed to improve management of wilderness, parks, and similarly protected areas. Managers and scientists from the five federal agencies assume an active role in developing programs and priorities to address the wilderness research needs of land management agencies. Located on the University of Montana campus in Missoula, the Leopold Institute is administered by the USDA Forest Service's Rocky Mountain Research Station.

### Leopold Institute Research Program

The Leopold Institute conducts, supports, and coordinates research on the biological and social attributes and benefits of wilderness, and on threats to these attributes and benefits. The Leopold Institute's research staff includes, in addition to the director, five full-time research scientists (a social scientist, recreation ecologist, landscape ecologist, zoologist, and fire ecologist), a biologist/GIS analyst, and a data analyst. The Institute also employs research assistants, graduate students, and post-doctoral associates. Research activities include in-house studies as well as cooperative and contract projects with scientists from other agencies and universities across the United States. All Institute research strives to improve wilderness management and respond to the needs of wilderness management agencies.

### Current Research Priorities

The ALWRI research program focuses largely on the following areas:

Recreation Understanding the effects of recreation use and recreation management strategies on wilderness attributes and visitor experiences. Topics of particular emphasis include ecological impacts and management tools, basic dimensions of human experiences, low-impact education, and restoration of damaged sites.

Natural (Wilderness) Fire Developing the understanding necessary to manage and restore fire as a natural process to wilderness and similarly protected wildlands. Emphasis is on understanding fire regimes and fire effects, social issues related to fire, and managing and restoring wildland fire.

Non-Native Species Understanding the effects of non-native species and their management in wilderness. At this time, Leopold Institute research involving non-native species largely falls into the areas of either invasive plants or fish stocking in wilderness areas.

Wildlife Under the leadership of U.S.G.S. Zoologist Steve Corn, an emerging priority is wildlife in wilderness with emphasis on understanding the status and reasons for decline of amphibian and desert tortoise populations. Other priorities include understanding the value of wilderness to wildlife conservation, the contribution of wildlife to wilderness values, and the effects of recreation on wildlife.

Importance is also given to such issues such as the role of wilderness in the face of changing societal demographics, mitigating conflicts among users, the meaning of naturalness, the development of monitoring protocols, and the impacts of scientific activities in wilderness.

### **Hot Topics**

In addition to addressing its research priorities, ALWRI has been involved in the following specific topics that are timely and critical to sustaining wilderness. The Leopold Institute has:

- Addressed the challenges of maintaining and restoring fire to wilderness areas.
- Addressed the challenges of managing for naturalness and wildness.
- Contributed to addressing the wilderness restoration dilemma—when and how is it appropriate to restore more “natural” conditions?
- Been developing a program to monitor aspects of wilderness character.
- Worked to understand day and high-density recreation use.
- Conducted research on recreation user fees.
- Developed a handbook and sponsored workshops on recreation use estimation.
- Been involved in wilderness mapping, helping to create maps and GIS boundary layers of the National Wilderness Preservation System.
- Endeavored to understand the controversy surrounding wildlife management activities in wilderness (e.g., fish stocking).

### **Research Application Program**

The Leopold Institute’s research application staff includes a program leader, and periodically employs a social science specialist, an ecology specialist, and a web designer. The Research Application Program is committed to improving communication and to forging closer ties between managers and researchers. Through myriad venues, the Institute assures research information is readily available to managers, educators, policy makers, other scientists, and the public. The Leopold Institute publishes research results in peer-reviewed journals and government reports, and also develops and maintains bibliographies, databases, and their website. Institute staff conduct workshops and provide consultation to scientists and managers.

### **Research in a Nutshell**

The Research in a Nutshell summaries highlight results, management implications, and associated publications and products of selected research projects conducted through the Leopold Institute. The Nutshells represent an ongoing effort that will include future research results as they become available. All Nutshells are available in PDF format on the Leopold Institute website.

### **Linking Wilderness Research and Management**

Each volume in this series of annotated reading lists begins with references necessary to understand the broad issue, and then provides references useful for identifying management goals, understanding influences on those goals, and finally, for selecting and implementing management approaches.

## **Publications**

The Leopold Institute has produced approximately 470 publications available on the following topics. These can be ordered through the Leopold Institute website.

### Disturbance – Natural and Human

Amphibian Decline  
Fire and Fire Restoration  
Natural Conditions/Variability  
Recreation Impacts  
Research Needs  
Naturalness vs. Wildness  
Pollution  
Threats

### Non-Native Species

Animals  
Fish  
Invasive Plants  
Livestock

### Recreation

Ecological Impacts  
• Campsites; Pack Stock; Trails; Trampling; Trends Over Time; Water; Wildlife  
Low-impact Practices  
Management Tools  
• Conflict; Education/Communication Tools; Planning Frameworks (e.g. LAC);  
Monitoring; Restoration Techniques  
Use Allocation/Estimation  
Research Needs  
Visitor Experiences  
• Conflict; Crowding/Solitude/Privacy; Defining Visitor Experiences; Perception of  
Impacts; Satisfaction; Study Methods; Trends; User Characteristics; Values of Visitors

### Research and Wilderness

Conducting Research  
Using Research  
Symposium Proceedings

### Wilderness in Landscapes

Adjacent Lands  
Protected Networks

### Wilderness and Social Systems

Ecotourism  
International  
Personal Growth Programs  
Values of Society

### Wildlife

Amphibians and Reptiles  
Birds  
Fish  
Management Activities  
Recreation Impacts  
Value of Wilderness to Wildlife

### Other Wilderness Management Issues

Fish Stocking  
Legislation/Policy  
Monitoring  
Rivers and Lakes

### **Leopold Institute Databases**

The Leopold Institute website features links to the following databases:

#### National Wilderness Preservation System (NWPS) Database

This database provides a searchable database for wilderness areas in the United States by agency, state, or size. The manuscript that contains the information used to generate the NWPS searchable database is also available in PDF format.

#### Wilderness Invaders-Surveys and Databases

Information is available on the following two specific projects and their associated databases:

(1) Interagency Exotic Plant Survey and (2) National Wildlife Refuge Invasive and Exotic Species Survey.

#### Wilderness Stewardship Reference System: Legislative, Administrative, and Judicial Information

This database serves as a research tool for wilderness managers, the public, students, and academics. The database is organized by issue, allowing quick, easy access to relevant sections of the numerous wilderness acts, agency policies, legislative histories, court cases, and past examples of management decisions.

#### Digital Wilderness Boundaries Database

A comprehensive standardized set of digital Geographic Information System coverages of the National Wilderness Preservation System and Wilderness Study Areas. These are served on the National Atlas website at [www.nationalatlas.gov](http://www.nationalatlas.gov), which hosts easy-to-use, map-like views of natural and sociocultural landscapes in the United States.

#### Leopold Institute Publications Database

[www.leopold.wilderness.net/pubs.cfm](http://www.leopold.wilderness.net/pubs.cfm)

### **Leopold Institute Website Links**

Visit the Leopold Institute website at [www.leopold.wilderness.net/links](http://www.leopold.wilderness.net/links) to view numerous links to wilderness-related Internet sites.

### **Leopold Institute Staff**

Leopold Institute staff members are listed on their website at [www.leopold.wilderness.net](http://www.leopold.wilderness.net).

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## Wilderness Training, Information, and Education Resources



### Focused Purpose

The Arthur Carhart National Wilderness Training Center was established in 1993 to preserve the values and benefits of wilderness for present and future generations by connecting agency employees and the public with their wilderness heritage through training, information, and education. The Center is jointly staffed and funded through an interagency partnership between the Bureau of Land Management, Fish and Wildlife Service, Forest Service, and National Park Service. Oversight is provided by national wilderness program leaders from each of these four wilderness-managing agencies.

Using an interagency team approach, a staff of seven works with experts, within and outside the agencies, to develop comprehensive interagency solutions to critical wilderness stewardship issues. Training offered and materials produced are in direct response to existing and anticipated wilderness and wilderness study area management issues, training needs, and educational outreach needs identified by wilderness managers from each agency through a needs assessment survey conducted every four years. Materials developed are distributed electronically, and training sessions are offered where they are needed most. This approach virtually eliminates duplication of effort, staff, and funding. By leveraging limited resources across agencies, the number of employees trained has increased by 580 percent, while the cost of training has been reduced 240 percent.

### Focused Direction

1. Improve consistency and collaboration in on-the-ground wilderness decisions among managers, stewardship skills among wilderness staff, and wilderness awareness among agency employees through training.
2. Enhance communication and consultation among the natural resource workforce, scientists, educators, students, and the public through ready access to a broad base of current and timely wilderness information.
3. Foster development of a personal stewardship ethic and support for the National Wilderness Preservation System among the American public by increasing awareness, knowledge, and understanding of their wilderness heritage.
4. Increase worldwide capacity for protected area management through training, information, and education.

### Focused Products

Training Two-day to one-week courses are offered to provide managers with the knowledge and skills needed to address critical wilderness management issues. For detailed course descriptions, objectives, target audiences, and dates of courses, visit the Internet at [www.carhart.wilderness.net](http://www.carhart.wilderness.net)

Wilderness Stewardship (National & Regional) Identify and apply wilderness management principles to successfully address critical wilderness management issues.

Unit Wilderness Workshop Apply specific information tailored to address immediate critical wilderness management issues.

Wilderness Restoration Determine best management practices to rehabilitate impacted sites.

Wilderness Planning Identify and implement the process for developing an area wilderness management plan.

Monitoring Natural Resources in Wilderness Demonstrate field techniques most appropriate for conducting natural resources monitoring and management in wilderness.

Managing Visitor Use in Wilderness Explore principles and techniques for determining physical and social carrying capacities.

Wilderness Interpretation and Education Identify the most effective methods to increase public understanding and support of wilderness. In addition to the listed courses, five Wilderness Management Distance Education Courses are offered through a partnership with the University of Montana. Four of the five courses are offered for graduate credit and one is available on-line. To learn more, visit the Internet at [www.wmdep.wilderness.net](http://www.wmdep.wilderness.net).

### **Information**

In partnership with the University of Montana and the Aldo Leopold Wilderness Research Institute, Wilderness.net was created to provide wilderness information and opportunities for interaction to the natural resources workforce, scientists, educators and the general public. Through searchable databases, Wilderness.net provides information on each of the more than 640 wilderness areas in the National Wilderness Preservation System, wilderness legislation, research, issues, photos, and more. This comprehensive website provides direct access to the Carhart Center website where Internet visitors can find information to help address critical wilderness stewardship issues. For example, the *Minimum Requirement Decision Guide* is designed to help managers effectively analyze proposed actions to minimize negative impacts to wilderness character and values. Similarly, the *Wilderness Access Decision Tool* is designed to help managers make appropriate, objective, consistent decisions regarding use of wilderness by persons with disabilities as defined by Americans with Disabilities Act of 1990. These and other documents can be found on the Internet at [www.carhart.wilderness.net](http://www.carhart.wilderness.net).

### **Education**

The Center has developed a K-12 *Wilderness and Land Ethics Curriculum* to provide classroom teachers, land managers, and outdoor educators with an interactive resource to promote awareness and appreciation of the cultural, environmental, and experiential values of wilderness. Additionally, the Center is working with a number of non-government organizations to develop partnerships to maximize limited resources from agency and non-agency organizations so that citizens from diverse demographic and ethnic groups have the information they need to be informed voters and participants in wilderness decisions. These efforts compliment the NPS Wilderness Education and Outreach Plan.

### **Focused Staff**

Arthur Carhart National Wilderness Training Center staff members are listed on the ACNWTC website at [www.carhart.wilderness.net](http://www.carhart.wilderness.net).

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